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GEOGRAPHIC VARIATION IN WHITE-WINGED DOVES WITH REFERENCE TO POSSIBLE SOURCE OF NEW FLORIDA POPULATION

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Abstract.—The white-winged dove (*Zenaida asiatica*) became established in southern Florida apparently from a release of 10 captive-reared pairs in 1959. Original stock is said to have been imported from Tampico, Tamaulipas, Mexico, in 1956. The new Florida population resembles native populations in the Gulf of Mexico lowlands and West Indies in being of relatively smaller size than those from other parts of the species' range in Mexico and Central America. There are slight average differences in color between populations in the Gulf of Mexico-West Indies region but the overlap is extensive and color is considered unreliable for identification. In measurements there is also great individual variation and overlap among populations, but significant differences exist between populations in certain measurements. There is so much overlap and lack of agreement in size and color characters that all populations in the Gulf of Mexico-West Indies region are considered as belonging to one subspecific taxon, *Zenaida a. asiatica*. Southern Florida specimens most closely resemble samples from Hispaniola and Cuba in combined size characters, and it is suggested that the Florida population may have originated in either of those two islands and reached Florida in avicultural trade through Tampico. Natural range extension from Cuba is considered a possibility.

The white-winged dove (*Zenaida asiatica*) is said to have become established as a breeding bird in southern Florida from a release of captive-reared individuals at Princeton, near Homestead, Dade County, Florida, by Frank M. Williams in 1959 (Saunders, 1980). There is a discrepancy between reports over the mode of release (Lovett Williams, pers. comm.), but in any case the doves apparently took up residence in Mr. Williams' avocado groves and nearby areas. By 1968 there were about 200 birds, which subsequently spread to surrounding areas (Fisk, 1968). Throughout the summer of 1970, flocks of up to 15 white-winged doves were observed regularly at widely scattered localities over a 40 square mile area of farmland and groves north of Homestead (Ogden, 1970; Owre, 1973). The species now appears to be well adapted to its new environment and has expanded its range northward along both Atlantic and Gulf Coasts of Florida to Fort Lauderdale and

Naples, possibly accelerated by captures and releases by state officials away from the point of origin (Williams, 1978).

The stock from which the southern Florida population of white-wings sprang originally was thought to have descended from six to eight birds from Venezuela and four from Mexico imported in 1954 (Fisk, 1968). However, Saunders (1980) says that he has learned through personal conversations and correspondence with aviculturalist Frank M. Williams that the four pairs of white-winged doves which were the forebears of the ten pairs released at Princeton in March 1959 were imported from Tampico, Tamaulipas, Mexico, in 1956.

The continuing doubt as to the exact native range of the ancestors of the present southern Florida population has prompted a new study of geographical variation within the species to try to find characters that will identify the Florida birds with a specific original population.

Preliminary examination of specimens of the new southern Florida population indicates that it was derived from one of the groups of relatively small white-winged doves inhabiting the eastern lowlands of Mexico, southern Texas, and the Greater Antilles. In recent years, those populations generally have been referred to the nominate race *Zenaida a. asiatica* (Linnaeus, 1758:163) with the type locality of Jamaica, West Indies (American Ornithologists' Union, 1957; Bond, 1956; Peters, 1961; Saunders, 1968a, 1968b:28). In that general area only one population, that from the Yucatan Peninsula, has been distinguished subspecifically from *Z. a. asiatica*. That population, described as having shorter wings and tail and having the back paler and grayer than *asiatica,* was named *Z. a. peninsulae* by Saunders (1968a). The type locality is San Felipe, near the mouth of the Rio Lagartos, northeastern Yucatan.

White-winged doves from Texas were described by Audubon (1844) and named *Columba trudeauii* without reference to Linnaeus' *asiatica*. Stone (1899:17) synonymized *trudeauii* with *Melopelia leucoptera* (Linnaeus, 1758:164), and that name, in turn, was considered a synonym of *Zenaida asiatica* (Linnaeus, 1758:163) by Ridgway (1916), an opinion which has prevailed since then. The type locality of *trudeauii* was restricted to the "Lower Rio Grande Valley" by Ridgway (1916).

Procedure

Having limited the probable origin of the ancestors of the new southern Florida white-wings on the basis of the general characteristics of the present birds and the alleged source of the stock, specimen samples were brought together from as many different parts of that general area as possible. These included the following samples: West Indies islands of Cuba 2 ♂, 2 ♀ and Hispaniola 7 ♂, 6 ♀; Jamaica (topotypical *asiatica*) 4 ♂, 6 ♀; southern

Florida (new population) 8 ♂, 5 ♀; southern Texas and northern Tamaulipas (representing *trudeauii*) 14 ♂, 4 ♀; southeastern San Luis Potosi and southern Tamaulipas (general area of Tampico) 10 ♂, 5 ♀; Veracruz and Tabasco (representing the southern Gulf Coast) 7 ♂, 6 ♀; Yucatan Peninsula (representing *peninsulae*) 18 ♂, 17 ♀.

The seven series of specimens were compared with each other, sex for sex, with respect to size and color. Measurements used in all comparisons were: chord of folded wing, tail length (from insertion of two central tail feathers to tip of longest feather), length of exposed culmen, tarsus, and middle toe (without claw).

All available adult specimens, irrespective of date of collection, were included in the measurements to maximize the sample size, despite the danger of including non-resident migrants. The measurements were examined to determine if migrant specimens might have distorted the results. Specimens of those populations which, because of their more southerly distributions, might be expected to include some migrants were grouped by arbitrary breeding season (April to August) and nonbreeding season (September to March). Despite what appear to be seasonal differences in a few measurements, it is believed that lumping the measurements without regard to season of the year has not distorted the overall measurement results importantly.

Differences between means for all measurements of all populations were submitted to an analysis of variance, with post-hoc testing. T-tests were employed separately to determine the significance of differences between mean measurements of certain populations and between sexes. $P < 0.05$ is considered significant. A discriminant analysis procedure (BMD07M) was also utilized to determine which of the candidate populations the southern Florida doves most closely resemble.

For color comparison only specimens taken from April to August (breeding season) were used. Comparisons were made with illumination by both "McBeth Examolite Fixture" and by natural daylight in shade.

Size Comparisons

The numbers of specimens, means, standard deviations, standard errors and ranges of measurements on which the t-tests were performed are shown in Table 1. Directions and probability of significance of differences between means of wing, tarsus, and middle toe measurements are shown in Table 2.

Sex differences in size.—Table 1 shows the probability of significant differences in mean measurements of males and females in the populations measured, as determined by the t-tests. Greater length in males is indicated in all measurements except the exposed culmen, tarsus and middle toe of Jamaican birds, but the differences are significant in only the greater length

Table 1.—Comparison of measurements (in mm) of white-winged dove population samples. Underlined probabilities of differences between sexes (L = male longer, S = male shorter) indicate significant differences.

Population	♂ n	♂ Range	♂ Mean	♂ SD	♂ SE	♀ n	♀ Range	♀ Mean	♀ SD	♀ SE	P
				Wing							
Jamaica	4	144.1–159.4	153.50	7.31	3.66	6	146.4–153.6	150.28	3.02	1.23	L0.4
Hispaniola-Cuba	9	149.1–159.3	155.04	3.16	1.05	8	147.2–155.3	152.70	3.23	1.14	L0.2
S. Florida	8	150.1–162.8	157.69	4.03	1.43	5	147.0–153.9	150.92	2.54	1.13	L0.01
S. Texas-N. Tamaulipas	14	152.3–163.1	155.69	3.06	0.82	4	143.8–149.0	146.78	2.17	1.08	L0.001
S. E. San Luis Potosi-S. Tamaulipas	10	150.6–158.3	155.03	2.81	0.89	5	147.0–152.3	148.66	2.14	0.96	L0.001
Veracruz-Tabasco	7	150.7–162.3	156.90	4.02	1.52	6	145.5–153.8	151.05	3.15	1.43	L0.02
Yucatan Peninsula	18	140.3–160.2	150.94	5.13	1.21	17	140.7–155.8	147.24	5.02	1.22	L0.05
				Tail							
Jamaica	4	98.7–111.1	104.60	6.26	3.13	6	86.3–98.1	95.03	4.34	1.77	L0.05
Hispaniola-Cuba	9	95.4–110.0	103.93	4.66	1.55	8	86.5–105.8	99.28	5.79	2.05	L0.1
S. Florida	8	87.5–116.2	104.25	9.81	3.47	5	97.4–105.0	100.78	2.78	1.24	L0.05
S. Texas-N. Tamaulipas	13	100.1–116.3	106.99	4.98	1.38	4	92.3–100.7	96.73	3.72	1.86	L0.01
S. E. San Luis Potosi-S. Tamaulipas	10	99.5–108.3	104.61	2.96	0.94	5	92.8–100.8	98.30	3.18	1.42	L0.01
Veracruz-Tabasco	6	96.4–111.8	106.48	5.38	2.20	6	92.4–106.3	100.35	5.41	2.21	L0.1
Yucatan Peninsula	18	91.7–115.5	103.39	6.25	1.47	17	91.8–104.4	99.44	3.98	0.97	L0.02

Table 1.—Continued.

Population	♂ n	♂ Range	♂ Mean	♂ SD	♂ SE	♀ n	♀ Range	♀ Mean	♀ SD	♀ SE	P
Exposed culmen											
Jamaica	4	18.0–19.8	18.93	0.74	0.37	6	18.0–20.6	19.10	0.87	0.35	S0.9
Hispaniola-Cuba	8	19.1–20.8	19.78	0.65	0.23	8	18.1–21.7	19.68	1.04	0.37	L0.9
S. Florida	8	18.7–21.4	20.01	0.91	0.32	4	18.2–20.4	19.63	0.99	0.50	L0.9
S. Texas-N. Tamaulipas	13	18.6–22.2	20.03	1.08	0.30	3	17.1–19.7	18.57	1.33	0.77	L0.1
S. E. San Luis Potosi-S. Tamaulipas	10	18.7–21.1	20.05	0.91	0.29	5	19.0–20.2	19.64	0.46	0.21	L0.4
Veracruz-Tabasco	7	18.8–21.4	19.77	0.93	0.35	6	19.0–20.8	19.52	0.79	0.32	L0.9
Yucatan Peninsula	18	18.7–21.4	19.71	0.78	0.17	17	17.3–20.0	19.01	0.82	0.20	L0.02
Tarsus											
Jamaica	4	23.01–25.1	23.80	0.91	0.46	6	23.0–25.7	24.37	0.90	0.37	S0.4
Hispaniola-Cuba	9	24.1–26.3	25.19	0.69	0.23	8	24.0–25.9	24.98	0.63	0.22	L0.9
S. Florida	8	25.4–27.9	26.19	0.81	0.29	5	24.8–25.8	25.30	0.35	0.15	L0.05
S. Texas-N. Tamaulipas	14	23.3–26.2	24.92	0.79	0.21	4	23.3–24.7	23.88	0.66	0.33	L0.05
S. E. San Luis Potosi-S. Tamaulipas	10	23.1–25.5	24.66	0.70	0.22	5	23.4–25.2	24.26	0.71	0.32	L0.4
Veracruz-Tabasco	7	23.9–25.5	24.94	0.77	0.29	6	23.1–24.6	23.97	0.67	0.27	L0.05
Yucatan Peninsula	18	23.3–25.9	24.29	0.79	0.19	17	23.0–25.6	23.98	0.69	0.17	L0.4
Middle Toe											
Jamaica	4	22.1–24.8	23.08	1.59	0.80	6	22.2–24.6	23.95	0.90	0.37	S0.4
Hispaniola-Cuba	9	24.0–25.6	24.99	0.57	0.17	8	23.0–25.9	24.58	1.15	0.41	L0.4
S. Florida	8	24.9–26.5	25.73	0.49	0.18	5	23.2–25.0	24.28	0.66	0.30	L0.001
S. Texas-N. Tamaulipas	14	22.3–25.7	24.14	1.07	0.29	4	22.0–24.5	23.28	1.10	0.55	L0.2
S. E. San Luis Potosi-S. Tamaulipas	10	22.2–25.3	23.90	1.04	0.33	5	22.2–25.0	23.26	1.21	0.54	L0.4
Veracruz-Tabasco	7	23.3–25.2	23.76	0.67	0.25	6	21.5–24.0	22.60	0.86	0.35	L0.02
Yucatan Peninsula	18	21.8–26.0	24.08	1.22	0.29	17	21.2–24.7	23.02	1.08	0.26	L0.02

Table 2.—Probability of difference *P* in mean measurements of white-winged dove samples.[1] Significant differences are underlined. Populations in left column are longer (L) or shorter (S) than those to the right. Values for males in upper diagonal; those for females in lower diagonal.

Wing

Male

	n	Jam 4	Yuc 16	Ver 7	SLP 8	Tex 14	Fla 8	Hisp 9
Jam	6	—	L0.4	S0.4	S0.9	S0.4	S0.4	S0.9
Yuc	15	S0.1	—	S0.02	S0.1	S0.01	S0.01	S0.05
Ver	6	L0.9	L0.1	—	L0.4	L0.5	S0.9	L0.4
SLP	5	S0.4	L0.1	S0.4	—	S0.5	S0.2	S0.9
Tex	4	S0.1	S-	S0.1	S0.4	—	S0.2	L0.9
Fla	5	L0.9	L0.1	S-	L0.2	L0.05	—	L0.2
Hisp	8	L0.2	L0.01	L0.4	L0.05	L0.01	L0.4	—

Female

Tarsus

Male

	n	Jam 4	Yuc 16	Ver 7	SLP 8	Tex 14	Fla 8	Hisp 9
Jam	6	—	S0.4	S0.1	S0.2	S0.05	S0.001	S0.02
Yuc	15	S0.4	—	S0.2	S0.5	S0.1	S0.001	S0.02
Ver	6	S0.4	L0.9	—	L0.4	L-	S0.01	S0.9
SLP	5	S0.9	L0.4	L0.5	—	S0.4	S0.01	S0.2
Tex	4	S0.4	L-	S0.9	S0.5	—	S0.01	S0.5
Fla	5	L0.1	L0.001	L0.01	L0.02	L0.01	—	L0.02
Hisp	8	L0.2	L0.01	L0.02	L0.1	L0.02	S0.4	—

Female

Middle toe

Male

	n	Jam 4	Yuc 16	Ver 7	SLP 8	Tex 14	Fla 8	Hisp 9
Jam	6	—	S0.4	S0.4	S0.5	S0.2	S0.01	S0.01
Yuc	15	S0.1	—	L0.9	L0.5	S0.9	S0.01	S0.1
Ver	6	S0.05	S0.9	—	S0.9	S0.5	S0.001	S0.01
SLP	5	S0.4	L0.9	L0.4	—	S0.4	S0.001	S0.01
Tex	4	S0.4	L0.9	L0.4	L-	—	S0.001	S0.05
Fla	5	L0.9	L0.02	L0.01	L0.2	L0.2	—	L0.02
Hisp	8	L0.4	L0.01	L0.01	L0.1	L0.1	L0.9	—

Female

[1] Abbreviations of populations: Jam, Jamaica; Yuc, Yucatan Peninsula; Ver, Veracruz-Tabasco; SLP, S. E. San Luis Potosi-S. Tamaulipas; Tex, S. Texas-N. Tamaulipas; Fla, S. Florida; Hisp, Hispaniola-Cuba.

of male Yucatan Peninsula wing, tail, culmen and tow; the S. E. San Luis Potosi-S. Tamaulipas wing and tail; Veracruz-Tabasco wing, tarsus and toe; the S. Texas-N. Tamaulipas wing, tail and tarsus; the S. Florida wing, tarsus and tow; and the Jamaica tail. There are no significant sex differences in Hispaniola-Cuba dove measurements.

Population differences in size.—The analysis of variance indicated that there are no significant differences between any two populations of white-winged doves measured in either tail or culmen lengths, so no further comparisons were made using those measurements. However, the analysis of variance indicated there quite probably are differences between some populations in mean wing, tarsus and middle toe lengths, as shown by the underlined percentages of probability in Table 2.

No significant differences are indicated by post-hoc tests in any measurement between Jamaica, Yucatan Peninsula or S. E. San Luis Potosi-S. Tamaulipas birds. Also, no significant differences were found between means of any measurements of S. E. San Luis Potosi-S. Tamaulipas, Veracruz-Tabasco, and S. Texas-N. Tamaulipas groups. The Hispaniola-Cuba and S. Florida series of specimens do show many significant differences from other populations, being larger in all cases, although differing from each other only in lengths of male tarsus and toe, which are longer in Florida birds; no significant differences appear between females of those two populations. The discriminant analysis confirmed the greater similarity between the S. Florida and Hispaniola-Cuba populations than between either of them and any other population. A classification procedure indicated that, on the basis of combined characters, six out of eight of the S. Florida males and four out of five of the females most closely resemble Hispaniola-Cuba specimens of the same sex, whereas two males and one female are closer to other populations.

It appears from t-tests that S. Florida and Hispaniola-Cuba populations not only resemble each other most closely, but that together they have longer wings, tarsi and toes than those of the combined populations from Jamaica, Yucatan Peninsula and S. E. San Luis Potosi-S. Tamaulipas. Veracruz-Tabasco and S. Texas-N. Tamaulipas specimens, although closer to Jamaica, Yucatan Peninsula and S. E. San Luis Potosi-S. Tamaulipas combined, are intermediate in measurements between that combined group and the combined S. Florida and Hispaniola-Cuba populations.

In attempting to sort out morphologically distinct geographical groups within the area covered in this study on the basis of measurements, we are confronted with an extremely variable and heterogeneous total population. There is a tendency for longer measurements, particularly those of wing, tarsus and middle toe, to be in the S. Florida and Hispaniola-Cuba areas, and for smaller measurements to be in the Yucatan Peninsula, Jamaica and S. E. San Luis Potosi-S. Tamaulipas groups. S. Texas-N. Tamaulipas and

Veracruz-Tabasco measurements are intermediate in various respects, but closer to the latter group.

Color Comparisons

Sex differences in color.—Females usually differ from males in slightly duller color, with the purplish hue of the crown and hindneck less pronounced or wanting, the rump less bluish gray, and the metallic gloss on the sides of the neck less distinct (noted by Ridgway, 1916, and verified in present study).

Population differences in color.—All seven geographic populations show considerable individual variation among specimens of both sexes, in addition to that caused by staining with grease and dirt. Taking the individual differences into account, when viewed in series there is an indication of geographical variation in the shade (dark or pale) and tone (grayish or rufescent) of color of the various population samples. Birds from S. Florida and Veracruz-Tabasco are alike in averaging darkest with respect to the shade of brown above and below and in the purplish coloration of the hindneck and crown. They are also relatively grayish in tone. Hispaniola-Cuba and Texas-N. Tamaulipas specimens average paler and somewhat more rufescent or buffy than S. Florida and Veracruz-Tabasco, and those from S. E. San Luis Potosi-S. Tamaulipas, Yucatan Peninsula, and Jamaica (which are quite similar to each other) average still paler and less rufescent than Hispaniola-Cuba and S. Texas-N. Tamaulipas birds. However, the color differences between all populations are slight and only discernible in mass effect of series of specimens. The individual variation between specimens in the series representing each population is so great, and the overlap in characters so complete, that it would be difficult to place most specimens in a particular population on the basis of color. In some instances the color variation may be due to plumage soiling or wear, and in others to museum age (fading or foxing). For example, the relatively pale and rufescent color of the Cuba-Hispaniola specimens may have resulted from fading and foxing during the period since collection; they were taken between 1915 and 1930. On the other hand, the recentness of collection of the S. Florida and Veracruz-Tabasco specimens (1940–1977) could have been responsible for their relatively darker and more grayish coloration. All in all, color differences noted in the specimens studied are too slight and overlapping to be a valid basis for separation of geographic populations.

Summary and Conclusions

Male white-winged doves average larger than females and are significantly larger, in all measurements except culmen, in certain populations. Males in general are more brightly colored than females.

In each of the seven geographical populations compared, sex by sex, there is considerable individual variation in both size and color, but also apparent average geographic differences in both respects. Color differences are considered unreliable. According to the analysis of variance and t-tests, the geographical differences between some populations in wing, tarsus, and middle toe are significant. No significant differences in tail or culmen were found by either test.

Although the results of the t-tests indicate three groups of populations—large, intermediate, and small, with the combined S. Florida and Hispaniola-Cuba population the largest and most distinct—the lack of agreement between measurements and color in distinguishing any two groups as well as the considerable individual variation and overlap between regional samples in these characters makes subspecific distinctions and grouping into different taxa dubious. Additional breeding specimens of all populations, but particularly from Jamaica, are necessary to demonstrate more definitely any differences or similarities that may exist between doves of the several geographic areas considered in this study. On the basis of present information it is recommended that all of the populations discussed herein remain combined in a single subspecies for which the name *Zenaida a. asiatica* (Linnaeus, 1758), originally applied to the Jamaican white-winged doves, has priority. Synonyms are: *leucoptera* (Linnaeus, 1758), *trudeauii* (Audubon, 1844), and *peninsulae* Saunders, 1968a. It should be noted that if further study shows that subspecific separation of the combined Hispaniola-Cuba-S. Florida population is warranted none of the above names would be applicable.

Although the study was not as conclusive as one might wish, it appears that the new southern Florida white-winged dove population originated from stock obtained in either Hispaniola or Cuba. It would seem quite possible that the birds were captured on one of those islands and shipped to the port of Tampico where they were obtained by Mr. Williams, the aviculturalist who liberated them or their progeny in Florida. However, we cannot be certain the pioneers of the new population, all or in part, did not find their way independently across the 100 mile wide Straits of Florida from Cuba.

It is possible that the new Florida population has evolved the distinctive characters noted for it, especially darker plumage coloration and exceptionally long tarsus and toe, in the course of becoming established in its present environment as have, apparently, the newly established eastern United States house finches (*Carpodacus mexicanus*). That population appears to have evolved a more dusky coloration and a significantly shorter tarsus and middle toe than the average of its California forebears since its first arrival on the Atlantic seaboard in 1940 (Aldrich and Weske, 1978). The fact that the new Florida white-winged dove aggregation is believed to have originated from a few hand-picked captive-reared ancestors (Saunders, 1980)

suggests that the distinctive characters noted may have resulted from genetic changes during captive propagation. Further collecting and study of white-winged dove specimens in Florida as well as elsewhere will be necessary to shed additional light on these interesting possibilities.

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Literature Cited

Aldrich, J. W., and J. S. Weske. 1978. Origin and evolution of the eastern house finch population.—Auk 95:529–536.

American Ornithologists' Union. 1957. Check-list of North American birds. 5th Edition.—Baltimore, Maryland.

Audubon, J. J. 1844. The birds of America. Vol. VII. p. 352, pl. 496.

Bond, J. A. 1956. Check-list of birds of the West Indies. 4th Edition.—Academy of Natural Sciences, Philadelphia.

Fisk, E. J. 1968. White-winged doves breeding in Florida.—Florida Naturalist 41:126.

Linnaeus, C. 1758. Systema Naturae, ed. 10 Vol. 1, pp. 163–164.

Ogden, J. C. 1970. Florida Region.—Audubon Field Notes 24:674.

Owre, O. T. 1973. A consideration of the exotic avifauna of southeastern Florida.—Wilson Bulletin 85:491–500.

Peters, J. L. 1961. Check-list of birds of the world. Vol. III.—Cambridge, Harvard University Press, p. 87.

Ridgway, R. 1916. The birds of North and Middle America.—Bulletin of the United States National Museum no. 50, Part VII:378.

Saunders, G. B. 1968a. Seven new white-winged doves from Mexico, Central America and southwestern United States.—North American Fauna 65:i–iv, 1–30 pp.

———. 1968b. P. 28 *in* Cottan, C., and J. B. Trefethen, eds. Whitewings. The life history, status and management of the white-winged dove.—D. Van Nostrand Co., Princeton, N. J. i–xv, 1–348 pp.

———. 1980. The origin of white-winged doves breeding in south Florida.—Florida Field Naturalist 8:50–51.

Stone, W. 1899. A study of the type specimens of birds in the collection of the Academy of Natural Sciences of Philadelphia with brief history of the collection.—Proceedings of the Academy of Natural Sciences of Philadelphia 51:5–62.

Williams, L. E., Jr. 1978. White-winged dove relocation experiment.—*In* Pittman-Robertson Federal Aid to Wildlife Restoration Project W-41, Florida Game and Fresh Water Fish Commission.

National Museum of Natural History, Washington, D.C. 20560.